
# Running Hyperledger Fabric on OpenShift

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# Agenda

- OpenShift and Kubernetes
- Hyperledger
- Hyperledger Fabric
- Issues with Running Hyperledger Fabric on OpenShift
- Workarounds - Ongoing Activities
- Join the Fun!
- Additional Resources
- Q&A

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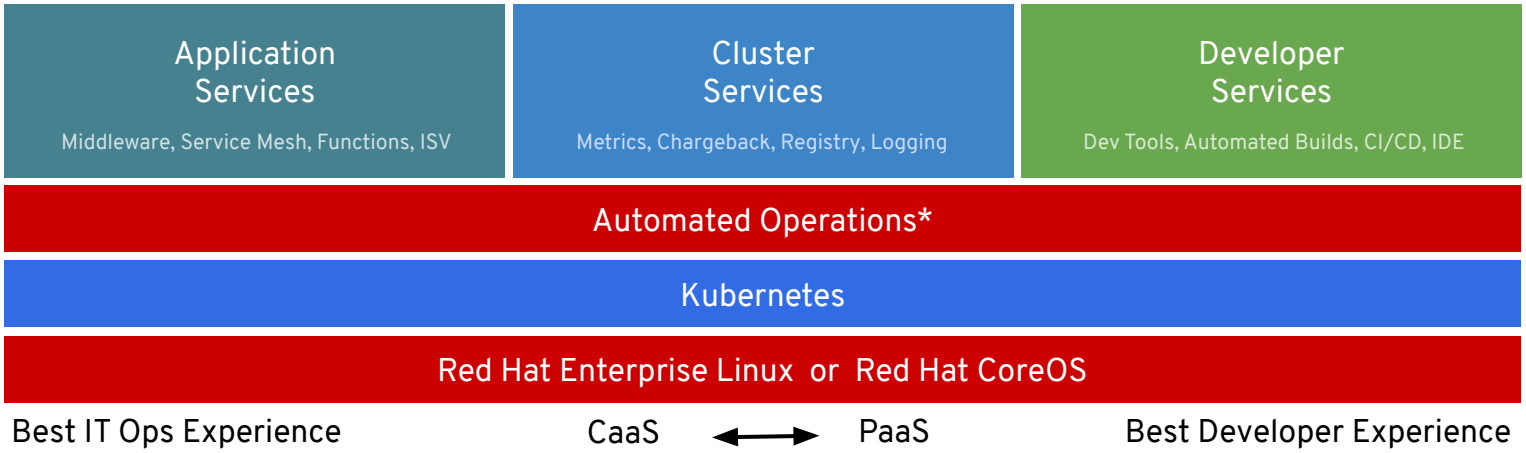
# Kubernetes and OpenShift

# OPENSHIFT CONTAINER PLATFORM




*coming soon

# CONTAINER CHALLENGES

## Container Security

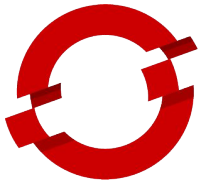
Image scanning, patching and compliance.

## Day 2 Management

Install, upgrade and maintenance.
Integrate existing enterprise technology.

## Application Delivery

Monitoring, metering and management.
Integrate existing developer tools.



RED HAT® OPENSHIFT®

## Trusted enterprise Kubernetes

Continuous security, world-class support and services, and deep expertise to confidently run any application.

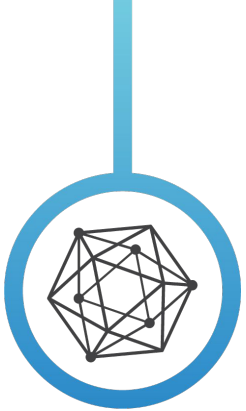
## A cloud-like experience, everywhere

Full-stack automated operations on a consistent foundation across on-premises or hybrid cloud infrastructure.

## Empowering developers to innovate

Get applications to production sooner with a wide range of technologies and streamlined workflows.

# Hyperledger and Fabric



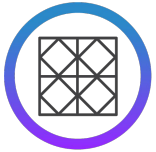
Hyperledger is a collaborative and global open source software community, hosted by The Linux Foundation, **advancing blockchain technologies for business.**

# Hyperledger Goals

Where open source teams build diverse approaches for business blockchain

## Create enterprise grade software

open source, distributed ledger frameworks & code bases to support business transactions



## Provide community-driven infrastructures

that are open, neutral and supported by technical and business governance

## Build technical communities

to develop blockchain and shared ledger POCs, use cases, field trials and deployments

## Educate the public

about the market opportunity for blockchain technology

## Promote our communities

taking a toolkit approach with many platforms and frameworks

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# Hyperledger Momentum

**3**

Years since launch

**126K+**

Commits

**6**

Tools

**6**

Frameworks

**3**

1.0+ Production Releases

**260+**

Members
(50+ in AsiaPac)

**11**

Active Community
Working Groups &
Special Interest Groups

**165+**

Meetups
Worldwide
(66 countries)

**56K+**

Meetup
Participants

**2,000+**

Media Clips Per Month

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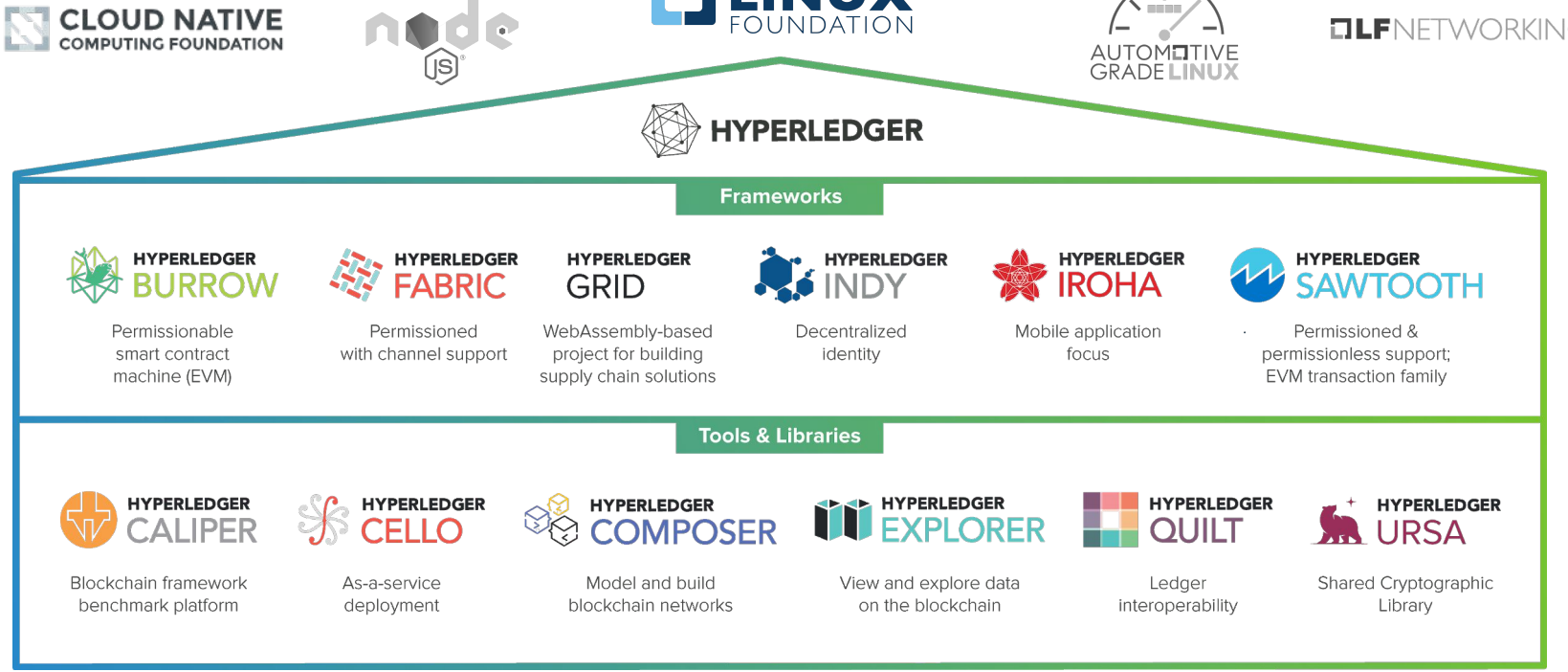
# The Hyperledger Greenhouse Architecture



# Hyperledger Fabric

| | |
|---|---|
| **Project** | HYPERLEDGER FABRIC |
| **Status** | ACTIVE |
| **CII Badge** | cii best practices passing |
| **Description** | Distributed ledger in Golang |

An enterprise grade permissioned distributed ledger platform that offers modularity and versatility to satisfy a broad set of industry use cases including finance, healthcare, supply-chain, and more.

300+ devs across 100+ companies contributing.

500+ customer PoCs, pilots and production.

# Hyperledger Fabric Project News

HYPERLEDGER FABRIC

- Maintaining a quarterly release cadence
- Hyperledger Fabric v1.4.1 released April 2019
- Hyperledger Fabric v2.0.0-alpha released for early access testing
- v1.4.x is our first long term support release

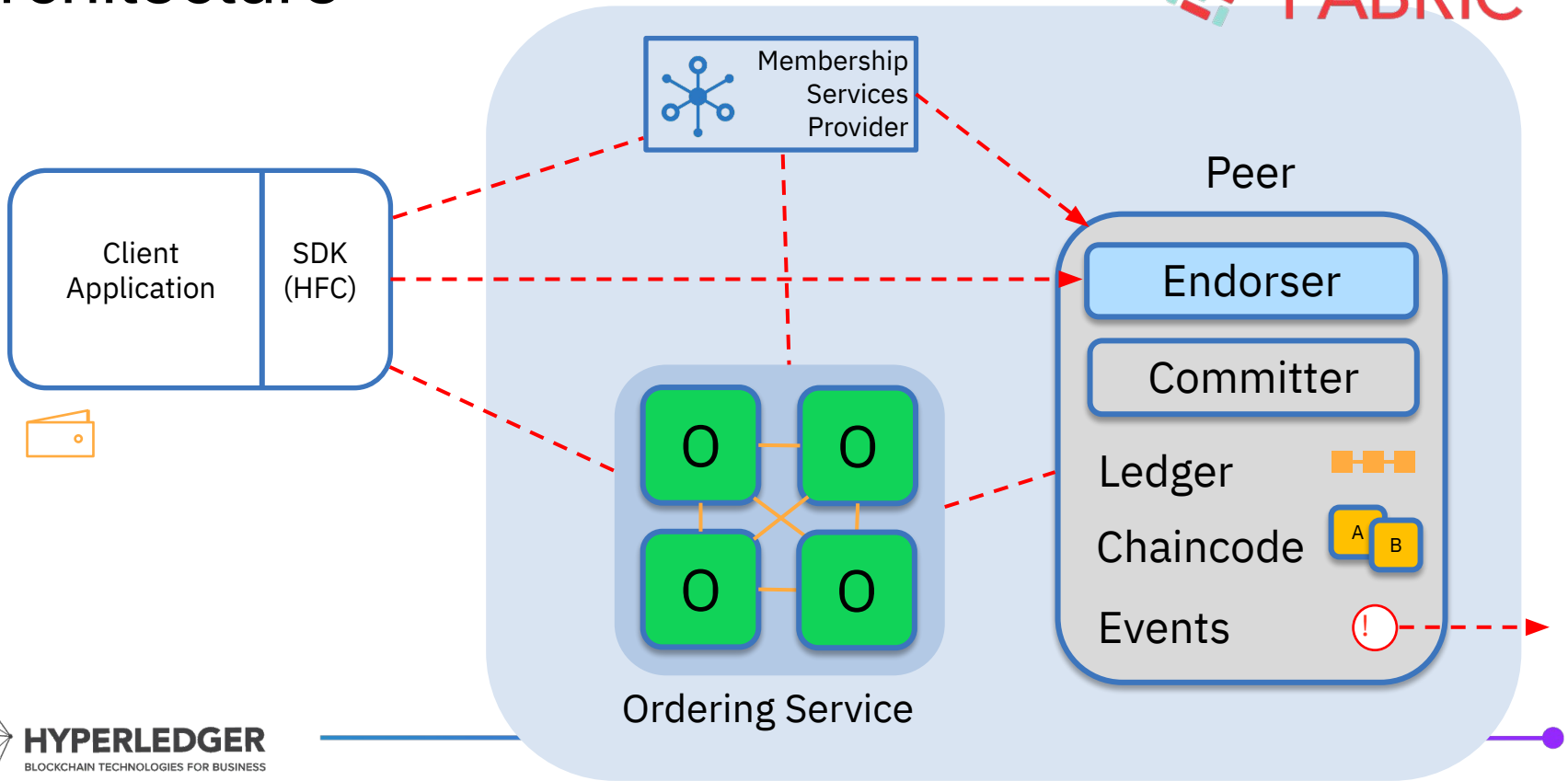
**New Features**:

- v1.4.1 support for Raft consensus orderer
- v2.0.0-alpha
  - new chaincode lifecycle support
  - FabToken support
  - Alpine based images
  - StateDB caching expected when 2.0 GAs this summer

# Characteristics


- Permissioned
- Highly modular
- Smart contracts in general purpose languages
- Pluggable consensus
- Privacy
- No “mining” or native crypto-currency required for consensus
- ***Execute-order-validate vs order-execute***

# Architecture

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# Hyperledger Fabric Runs On All Major Clouds

# Issues with Fabric on OpenShift

# Main Issues

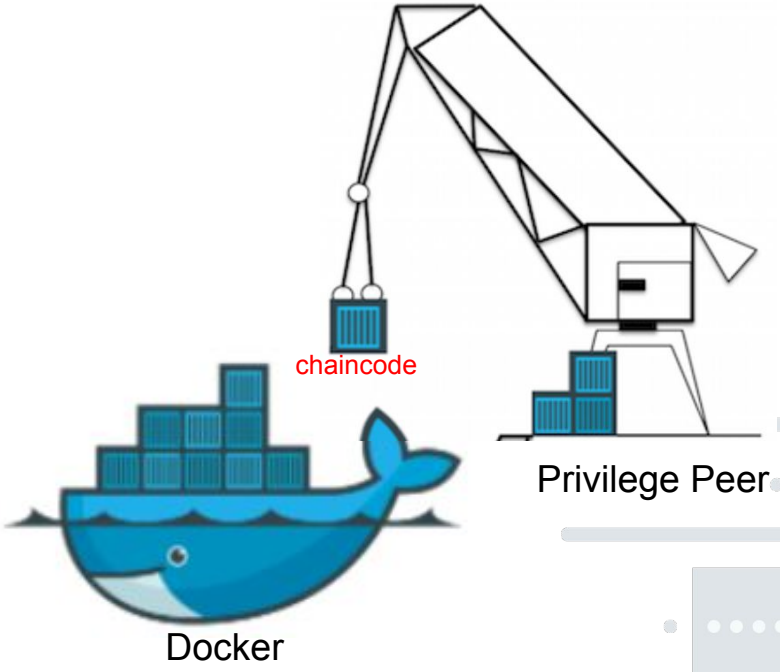
- Most Hyperledger Fabric deployment examples are designed for Docker based installs
  - Use of host mounts
  - Use of docker-compose and docker calls
  - Assume a single system
  - Not kubernetes friendly

- Use of Peer Managed Containers for Chaincode
  - Docker in Docker

# Problem: Peer-Managed Containers

- Chaincode doesn't work well with standard cloud native stack
  - Chaincode can't be provisioned and scaled by cloud native tools
  - Chaincode produced by peer lives in peer's docker store causing name collision

- Peer requires elevated privilege
  - Non-standard security practice
  - Peer is not contained by the container: a malicious peer can access host system
  - Standard practices don't allow elevated privilege in production



# Solutions

# Short Term

- No immediate way around Docker in Docker
  - Security risk remains so evaluate risks before production use
  - *setenforce permissive*
    - Allows use of docker.sock
    - Make sure you change it on all the nodes
  - *oc adm policy add-scc-to-user anyuid -z default*
    - Privileged mode

# Short Term

- Hyperledger Cello
  - Now supports Ansible
  - https://www.hyperledger.org/projects/cello
- Hyperledger Lab - Nephos
  - Python and Helm based
    - Requires python3.7 - not on RHEL7
  - https://github.com/hyperledger-labs/nephos
- Brute Force

# Short Term - Brute Force!

- Look to use Secrets and ConfigMaps to replace host mounts
- Use NFS mounts where needed
  - *oc adm policy add-scc-to-user hostmount-anyuid -z default*
- Replace *docker-compose*, *docker* calls with:
  - *kubectl , oc, podman,Buildah, kompose*
- Convert docker-compose.yaml files with kompose
  - *kompose convert --provider=openshift -f*
    - Then edit and merge files
- Alternate (if fairly simple yaml file)
  - *kompose up --provider==openshift -f*

# Long Term

- Chaincode deployment and life cycle management redesign
  - Design work ongoing in Hyperledger Fabric v2 stream
  - https://jira.hyperledger.org/browse/FAB-14492
  - https://jira.hyperledger.org/browse/FAB-14493

- Potential use of operators to manage containers

# Potential Long Term Activities

- See disclaimer slide at start of presentation!
  - None of this is promised !
- Build containers on RHEL / UBI base
  - Would provide Red Hat ease of mind
- Get OpenShift into the Hyperledger CI/CD stream
  - Find issues before code changes accepted
- Middleware Integration
  - Replace Kafka with AMQ Streams
  - Camel, Fuse, etc

# Ready, Set, Go

A quick overview of running Hyperledger Fabric on OpenShift 3.11

# Create a new project
*oc new-project hyperledger*

# Required to allow pods /containers to run as root
*oc adm policy add-scc-to-user anyuid -z default*

# This is also needed if you choose to use hostmount as a PV
*oc adm policy add-scc-to-user hostmount-anyuid -z default*

# Get the bits
*git clone https://github.com/IBM/blockchain-network-on-kubernetes.git*

# Ready, Set, Go

# Get in the proper place
*cd blockchain-network-on-kubernetes*

# Set up storage definition to support NFS mount
*vi configFiles/createVolume.yaml*

# Mark the setup and delete as executable
*chmod +x setup_blockchainNetworkv1.sh*
*chmod +x delete_blockchainNetwork.sh*

# Run the install
*./setup_blockchainNetworkv1.sh*

# Join the Fun!

# Contributing to Hyperledger Fabric

- You don’t need to be a member of Hyperledger to contribute
  - A Linux Foundation ID is needed to submit code though
- Many ways to be involved
  - Filing defects, enhancement requests, code fixes, etc
- A great “How to Contribute” document can be found here:
  - https://hyperledger-fabric.readthedocs.io/en/latest/CONTRIBUTING.html

# A Few Ways to Participate in Hyperledger

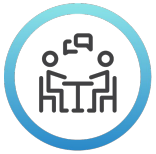
**Subscribe**
to Hyperledger Mailing Lists

**Attend**
Hyperledger Hackfests and upcoming blockchain events

Get the latest **development updates** from the wiki

Engage in the discussion on **Chat**

Search for Open Bugs, or Report a New One, in **Our Bug Database**



Start or join a local Hyperledger **Meetup**

**Participate** in the Working Group meetings

Check out all the Hyperledger business blockchain technologies and **download our codebases**

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**On-demand Webinar:** Get Involved! How to get started with Hyperledger

# Participating in Hyperledger

- There are a wide range of subject areas
  - Identity, crypto, learning materials, documentation, marketing, ...
  - Research (WG, SIGs)
    - Supply chain, telecom, FSI, public sector, social impact, ...
  - Diversity and Inclusion
  - Project contributors
    - Many different programming languages
    - Many different technologies

# Additional Resources

# For More Information

- https://www.hyperledger.org/
- https://www.hyperledger.org/projects/fabric
- http://kompose.io

# Q & A

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